

the adhesion of a hard coat. According to the rectangular pulse wave-form (for example, shown in Fig.5) of the conventional electric power unit for electric discharge surface treatment, the electrode material is emitted and at the same time the electrode material and the workpiece are melted by one shot of electric discharge. Therefore, it is difficult to ensure an appropriate quantity of electrode material to be supplied. Accordingly, there are problems such as a removal of the workpiece, which is caused by the lack of supply of electrode material, and an insufficient melt of the hard coat which is caused by the excessive supply of electrode material.

Disclosure of the Invention

The present invention has been achieved to solve the above problems. It is an object of the present invention to provide an electric power unit for electric discharge surface treatment and a method of electric discharge surface treatment by which a surface treatment cost can be reduced and a tight hard coat can be formed on a workpiece.

The present invention provides an electric power unit for electric discharge surface treatment by which electric discharge is generated between an electrode for electric discharge surface treatment and a workpiece so that a hard coat is formed on a surface of the workpiece by the energy

of electric discharge, the electric power unit for electric discharge surface treatment comprising: a control means for dividing an electric discharge current pulse into a first pulse width T_1 (first peak value I_{p1}), a second pulse width T_2 (second peak value I_{p2}), . . . , and an n -th pulse width T_n (n -th peak value I_{pn}) (n is an integer 2 and more), the control means for setting the first pulse width T_1 and the first peak value I_{p1} so that an electric current density between the electrodes can be in a predetermined range to suppress the emission of electrode material, the control means for setting the k -th pulse width T_k and the k -th peak value I_{pk} ($2 \leq k \leq n$, k is an integer) so that a quantity of supply of hard coat material by the emission of electrode material can be a predetermined value determined according to a predetermined processing condition.

The present invention provides a method of electric discharge surface treatment for forming a hard coat on a surface of a workpiece by which electric discharge is generated between an electrode for electric discharge surface treatment and the workpiece so that the hard coat is formed on the surface of the workpiece by the energy of electric discharge, the method of electric discharge surface treatment comprising the steps of: dividing an electric discharge current pulse into a first pulse width T_1 (first peak value I_{p1}), a second pulse width T_2 (second

peak value I_{p2}), . . . , and an n -th pulse width T_n (n -th peak value I_{pn}) (n is an integer 2 and more); setting the first pulse width T_1 and the first peak value I_{p1} so that an electric current density between the electrodes can be in a predetermined range to suppress the emission of electrode material; and setting the k -th pulse width T_k and the k -th peak value I_{pk} ($2 \leq k \leq n$, k is an integer) so that a quantity of supply of hard coat material by the emission of electrode material can be a predetermined value determined according to a predetermined processing condition.

Since the present invention is composed as described above, the following effects can be provided.

According to the electric power unit for electric discharge surface treatment and the method for electric discharge surface treatment of the present invention, it is possible to effectively make electrode material adhere onto a surface of a workpiece. Therefore, the cost of surface treatment can be reduced.

Further, it is possible to ensure an appropriate quantity of supply of the electrode material. Therefore, it is possible to form a tight hard coat on the workpiece.

Brief Description of the Drawings